PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

VOL. II. MAY, JUNE & JULY, 1842. No. 22.

Stated Meeting, May 6.

Present, thirty-seven members.

Dr. CHAPMAN, Vice-President, in the Chair.

Mr. Nicollet, a member elect, was presented to the presiding officer, and signed the Laws.

Letters were read:—

From the Academy of Sciences of Paris, dated 11th Oct. 1841,—the Museum of Natural History of Paris, dated 16th Nov. 1841,—the Royal Institution of London, dated 29th Nov. 1841, and 22d Jan. 1842,—the Geological Society, dated 20th Jan. 1842,—the Zoological Society, dated 14th Jan. 1842,—the Linnean Society, dated 20th Jan. 1842,—the Society of Arts of London, dated 22d Jan. 1842,—the Boston Natural History Society, dated 6th April, 1842,—the Lyceum of Natural History of New York, dated 12th April, 1842, severally acknowledging the receipt of copies of the Society's Transactions and Proceedings:—

From the Museum of Natural History of Paris, dated 28th Feb. 1842, in relation to the transmission to this Society of the Archives of the Museum:—

From the London Electrical Society, dated 31st Dec. 1841, stating that Part III. of their Proceedings had been forwarded to this Society:—

From Mr. Samuel Bailey, dated Sheffield, 15th Dec. 1841, presenting a copy of his treatise on Berkley's Theory of Vision:—

From Messrs. R. Murchison and Edward Sabine, General

Secretaries of the British Association, dated 12th Feb. 1842, requesting to be informed whether any members of this Society would attend the annual meeting of the Association in June next:—

From Mr. William Vaughan, of London, dated 5th March, 1842, relating to a parcel forwarded on behalf of the Linnean Society:—and

From Dr. D. Humpreys Storer, dated 24th April, 1842, and Mr. Simeon Borden, dated 25th April, 1842, severally acknowledging the honour done them by their election as members of the Society.

The following donations were announced:—

FOR THE LIBRARY.

Proceedings of the Royal Astronomical Society of London. Vol. V. Nos. 19 & 20. 8vo. London, 1842.—*From the Society.*

Twenty-fifth Annual Report of the Superintending Committee of the London Provident Institution. 8vo. London, 1841.—*From Mr. William Vaughan.*

A Review of Berkley's Theory of Vision, designed to show the Unsoundness of that Celebrated Speculation. By Samuel Bailey. 8vo. London, 1842.—*From the Author.*

The American Medical Library and Intelligencer. By Robley Dunglison, M.D. New Series. Vol. I. No 9. For March. 8vo. Philadelphia, 1842.—*From the Editor.*

Manners and Household Expenses of England in the Thirteenth and Fifteenth Centuries. By Beriah Botfield, Esq. 4to. London, 1841.—*From the Author.*

The Manuscript Rarities of the University of Cambridge. By James Orchard Halliwell, Esq. 8vo. London, 1841.—*From the Author.*

The Character of Sir John Falstaff. By James Orchard Halliwell, Esq. 12mo. London, 1841.—*From the Author.*

List of Members of the Royal Society. 30th November, 1841. 4to. London, 1841.—*From the Society.*

The Journal of the Royal Geographical Society of London. Vol. XI. Part 1. 8vo. London, 1841.—*From the Society.*

Proceedings of the London Electrical Society. Session 1841-2. 8vo. London, 1841.—*From the Society.*

Fifty-fifth Annual Report of the Regents of the University of the

State of New York. Made to the Legislature, March 1, 1842. 8vo. Albany, 1842.—*From the Regents.*

Jahrbucher der Literatur. Nos. 93 to 96 inclusive. 8vo. 1841.—*From the Baron von Hammer Purgstall.*

On a New Magnetic Instrument for the Measurement of the Inclination and its Changes. By the Rev. Humphrey Lloyd. 8vo. Dublin, 1842.—*From the Author.*

Ueber den Galvanismus als chemisches Heilmittel gegen örtliche Krankheiten, von Dr. Gustav Crusell. Mit einem Schreiben von M. Markus. 8vo. St. Petersburg, 1841.—*From the Author.*

Mémoires de l'Académie Impériale des Sciences de Saint Pètersbourg. VIme. Série. Première Partie, *Sciences Mathématiques et Physiques.* Vol. II. Parts 5 & 6. 4to. St. Petersburg, 1840. *From the Academy.*

Mémoires de l'Académie, &c. Seconde Partie, *Sciences Naturelles.* Vol. III. Parts 5 & 6, & Vol. IV. Parts 1, 2, 3, 4 & 5. 4to. St. Petersburg, 1840–41.—*From the same.*

Mémoires de l'Académie, &c. *Sciences Politique, Histoire et Philologie.* Vol. IV. Part 6, & Vol. V. Parts 1, 2, 3 & 4. 4to. St. Petersburg, 1840–41.—*From the same.*

Mémoires de l'Académie, &c. Mémoires par Divers Savans, et lus dans ses Assemblées. Vol. IV. Parts 3 & 4. 4to. St. Petersburg, 1841.—*From the same.*

Recueil des Actes de la Séance Publique de l'Académie Impériale des Sciences de Saint Pètersbourg, tenue le 29 Décembre, 1840. 4to. St. Petersburg, 1841.—*From the same.*

Institut Royal de France. Rapport du Secrétaire Perpétuel de l'Académie Royale des Inscriptions et Belles Lettres, etc. Lu le 14 Janvier, 1841. Paris, 1841.—*From the Institute.*

Tijdschrift voor Natuurlijke Geschiedenis en Physiologie. Uitgegeven door J. Van der Hoeven en W. H. de Vriese. Vol. IX. Part 1. 8vo. Leyden, 1841.—*From the Editors.*

Case, and Opinion of P. S. Du Ponceau and A. Davezac, Counsellors, on the Contested Seat of the Hon. David Levy. 8vo. Alexandria, D. C., 1841.—*From Mr. Du Ponceau.*

FOR THE CABINET.

Specimens of Wood taken from a beam out of the Ruins of Uxmal, Central America. This wood is derived from a tree called *zapodillo*, and is said by the natives to be insusceptible of decay.—*From Mr. James M'Kennan.*

A Specimen of Sponge, and Nineteen Specimens of Shells, from Central America.—*From the same.*

Prof. Bache read a paper, entitled "Observations of the Magnetic Dip in the United States, Fourth Series, by Elias Loomis, Professor of Mathematics and Natural Philosophy in Western Reserve College, Ohio," which was referred to a Committee.

Professor Loomis begins this paper by giving the results of further experiments to test the accuracy of the axle of his dipping needle, namely, a series made by Mayer's method; these proved satisfactory, the individual results presenting some discrepancies, but the mean agreeing very nearly with the dip previously obtained. The mean of observations hitherto made with this needle by the usual method, and by the series in different azimuths and by Mayer's method combined, differed but 0.1′, correction having been made to reduce the observations to the same epoch.

Prof. Loomis then gives the magnetic dip observed by the ordinary method at the following named places, as follows:

Brooklyn, Ohio, April 23, 1841, lat. 41° 30′ N., long. 81° 43′ W., Dip 73° 16′.3.

Tallmadge, Ohio, April 26, lat. 41° 06′ N., long. 81° 27′ W., Dip 72° 55′.2.

Tallmadge, Ohio, Oct. 13, lat. 41° 06′ N., long. 81° 27′ W., Dip 72° 51′.5.

Cleveland, Ohio, August 12, lat. 41° 30′ N., long. 81° 41′ W., Dip 73° 04′.3.

Monroe, Michigan, Aug. 14, lat. 41° 55′ N., long. 82° 28′ W., Dip 73° 19′.0.

Ypsilanti, Michigan, August 16, lat. 42° 14′ N., long 83° 38′ W., Dip 73° 18′.8.

Ann Arbor, Michigan, Aug. 16, lat. 42° 18′ N., long. 83° 45′ W., Dip 73° 16′.5.

Detroit, Michigan, Aug, 17, lat. 42° 19′ N., long. 83° 03′ W., Dip (mean of four series at three stations) 73° 35′.3.

Mackinac, Michigan, Aug. 21, lat. 45° 51′ N., long. 84° 41′ W., Dip (mean of four series at two stations) 76° 38′.9.

Fort Brady, Michigan, Aug. 25 & 27, lat. 46° 30′ N., long. 84° 24′ W., Dip (mean of three series at three stations) 77° 29′.7.

Gros Cap, Canada, Aug. 26, lat. 46° 32′ N., long. 84° 43′ W., Dip 77° 05′.3.

South Manitou, Michigan, Aug. 31, lat. 45° 05′ N., long. 85° 38′ W., Dip 75° 59′.3.

Chicago, Illinois, September 2, lat. 41° 53′ N., long. 87° 44′ W., Dip (mean of two series at two stations) 72° 47′.7.

Galena, Illinois, September 4, lat. 42° 28′ N., long. 90° 13′ W., Dip (mean of two series at two stations) 73° 02′.1.

Galena, Illinois, September 13, lat. 42° 28′ N., long. 90° 13′ W., Dip 73° 03.′0.

Mineral Point, Wisconsin, Sept. 6, lat. 42° 51′ N., long. 89° 58′ W., Dip 73° 23′.2.

Mineral Point, Wisconsin, Sept. 10, lat. 42° 51′ N., long. 89° 58′ W., Dip 73° 23′.0.

Blue Mounds, Wisconsin, Sept. 7, lat. 43° 00′ N., long. 89° 36′ W., Dip 73° 34′.9.

Madison, Wisconsin, Sept. 8, lat. 43° 03′ N., long. 89° 11′ W., Dip (mean of two series at two stations) 74° 06′.5.

Campbell's, Wisconsin, Sept. 9, lat. 43° 01′ N., long. 89° 26′ W., Dip 73° 28′.1.

Hickok's, Wisconsin, Sept. 9, lat. 42° 58′ N., long. 89° 47′ W., Dip 73° 39′.5.

Platteville, Wisconsin, Sept. 11, lat. 42° 43′ N., long. 90° 14′ W., Dip (two series at two stations) 73° 17′.4.

Peru, Illinois, Sept. 16, lat. 41° 23′ N., long. 89° 05′ W., Dip (two series at two stations) 71° 51′.1.

Pekin, Illinois, Sept. 18, lat. 40° 35′ N., long. 89° 36′ W., Dip 71° 13′.2.

Copperas Creek, Illinois, Sept. 18, lat. 40° 30′ N., long. 89° 48′ W., Dip 71° 04′.0.

Alton, Illinois, Sept. 22, lat. 38° 54′ N., long. 90° 04′ W., Dip (two series, at two stations) 69° 34′.8.

Upper Alton, Illinois, Sept. 22, lat. 38° 55′ N., long. 90° 03′ W., Dip (two series, at two stations) 69° 45′.7.

Edwardsville, Illinois, Sept. 23, lat. 38° 50′ N., long. 89° 53′ W., Dip 69° 57′.7.

Bunker Hill, Illinois, Sept. 24, lat. 39° 04′ N., long. 89° 53′ W., Dip 69° 49′.1.

Monticello, Illinois, Sept. 25, lat. 38° 57′ N., long. 90° 05′ W., Dip 69° 38′.9.

St. Louis, Missouri, Sept. 29, lat. 38° 38′ N., long. 90° 04′ W., Dip 69° 25′.5.

Vincennes, Indiana, October 1, lat. 38° 43′ N., long. 87° 29′ W., Dip (two series, at two stations) 69° 52′.8.

Cincinnati, Ohio, Oct. 5, lat. 39° 06′ N., long. 84° 27′ W., Dip 70° 27′.7.

Columbus, Ohio, Oct. 7, lat. 39° 57′ N., long. 83° 03′ W., Dip 71° 03′.7.

Hebron, Ohio, Oct. 8, lat. 39° 59′ N., long. 82° 29′ W., Dip (two stations) 71° 10′.1.

Frazersburgh, Ohio, Oct. 9, lat. 40° 09′ N., long. 82° 08′ W., Dip (two stations) 71° 48′.7.

Dover, Ohio, Oct. 11, lat. 40° 33′ N., long. 81° 30′ W., Dip 72° 19′.2.

Fulton, Ohio, Oct. 12, lat. 40° 55′ N., long. 81° 38′ W., Dip 72° 38′.9.

Clinton, Ohio, Oct. 12, lat. 40° 58′ N., long. 81° 40′ W., Dip 72° 44′.0.

Hudson, Ohio, Oct. 27, lat. 41° 15′ N., long. 81° 27′ W., Dip 72° 48′.7.

Hudson, Ohio, November 13, lat. 41° 15′ N., long. 81° 27′ W., Dip 72° 48′.7.

Prof. Bache also read a note by Prof. Loomis, as a supplement to his paper on the Storm of December 20, 1836, which was referred to a Committee.

These supplementary meteorological observations include the height of the barometer, and are from the journals of Mr. J. N. Nicollet, at Fort Snelling, lat. 44° 53′ N. and long. 93° 12′ W., and of Prof. Joseph Ray, at Cincinnati. They are important, as showing that the coincidence of the period of minimum of the barometer and of the change of wind to the N. W. was not general, and lead to an increased curvature in the lines of barometric minimum in the north-western part of the United States. The conclusion which Professor Loomis draws is, that "the atmospheric wave in latitude 45° travelled with nearly twice the velocity it did in latitude 30°. The entire range of the barometer at Fort Snelling, was .67 inch, about half what it was in longitude 72° in the same parallel. At the same rate, the oscillation would be reduced to about one-third of an inch in the neighbourhood of the Rocky Mountains."

Mr. Walker read a paper, entitled "Astronomical Observations made at various Places in the United States, by J. N. Nicollet," which was referred to a Committee.

This paper contains a list of Observed Transits of Mercury, Solar Eclipses, and Occultations of fixed Stars, chiefly by Mr. Nicollet and Prof. Verot.

No.	Date.	Phase.	Place.	Mean Time.	Observer.
	1824.			*h. m. s.*	
1	June 26	Begin. solar ecl.	Fort Charlotte	6 7 1.00	Ferguson.
2	„ 26	End „		7 13 19.20	„
	1832.				
3	May 4	Em. Merc. I. L.	St. Mary's College	22 28 37.20	Nicollet.
4	„ 4	„ centre	Baltimore	22 29 33.90	„
5	„ 4	„ II. L.	„	22 30 46.60	„
6	July 7	Im. γ Libræ d. l.	„	10 0 4.63	„
7	„ 26	Begin. solar ecl.	„	18 47 35.95	„
8	„ 26	End	„	20 31 48.05	„
9	„ 26	Begin.	„	18 47 48.95	Verot.
10	„ 26	End	„	20 31 35.07	„
11	Nov. 28	Im. γ Capri. d. l.	„	6 12 10.25	Nicollet.
	1834.				
12	Mar. 12	Im. τ Piscium	„	7 26 50.00	Verot.
13	Sept. 14	Im. ψ Capricorni	„	8 13 41.00	„
14	Nov. 9	Im. γ Aquarii	„	5 43 0.00	„
15	„ 30	Begin. solar ecl.	„	0 51 58.80	„
16	„ 30	End „	„	3 31 31.20	„
17	„ 30	Begin. „	Milledgeville, Ga.	0 15 7.00	Nicollet.
18	„ 30	Begin. tot. dark.	„	1 42 36.70	„
19	„ 30	End „	„	1 43 52.00	„
20	„ 30	End solar ecl.	„	3 5 28.10	„
	1835.				
21	May 3	Im. ψ Geminor.	Baltimore	10 27 45.00	Verot.
22	Nov. 7	Em. Merc. cent.	„	0 27 12.00	„
23	„ 7	II. L.	„	0 28 8.00	„
	1836.				
24	May 14	Begin. solar ecl.	„	*18 53 45.00	„
25	„ 14	End „	„	*21 19 32.00	„
	1838.				
26	June 30	Im. α Virginis	Red Pipe Stone Quarry	10 43 7.28	Nicollet.
27	Sept. 18	Begin. solar ecl.	Baltimore	3 7 22.00	Verot.
38	„ 18	Form. ring „	„	4 25 33.00	„
29	„ 18	Rupt. ring „	„	4 30 54.00	„
30	„ 18	End „	„	5 40 41.00	„
31	„ 18	Begin. „	Ti Tanka Taminan Lake	Not observ'd	Nicollet.
32	„ 18	End „		4 18 6.85	„
33	„ 18	Begin. „	Newport, Mo.	1 53 16.77	Goebel.
34	„ 18	End „	„	4 40 42.22	„
	1839.				
35	July 6	Em. ν Tauri	Coteau du Missouri	15 49 35.50	Nicollet.
36	Nov. 20	Im. „	St. Louis	6 12 14.70	„
	1841.				
37	June 5	Im. σ Sagittarii	Newport, Mo.	15 40 7.94	Goebel.

* Nos. 24 and 25 are clock time, the rest are mean time of the place of observation.

Nos. 1 & 2, by Mr. James Ferguson, Astronomer to the American Commission for determining the Northern Boundary. Dollond, 2½ feet, power 60. Latitude 47° 58′ 34″; long. 5*h* 59*m* 58*s*.0 West of Greenwich.

Nos. 3—5, by Mr. Nicollet, at St. Mary's College, Baltimore. Lat. 39° 17′ 55″; long. 5*h* 6*m* 30*s*. Dollond, p. 100. Nos. 4 & 5, very correct. Time recorded by the Rev. Mr. A. Verot, Professor of Mathematics and Natural Philosophy, in St. Mary's College.

Nos. 6—11, good observations. No. 7, with power 75; No. 8, power 100; Nos. 9 & 10, power 30. Time noted by Professor Ducatel; No. 11, power 100.

Nos. 17—19, by Mr. Nicollet, at Milledgeville State House—Senate Hall. Lat. 33° 4′ 30″; long. 5*h* 33*m* 20*s*. The telescope was procured by Mr. Nicollet of Dr. Milton Antony. Mr. Nicollet was assisted by Drs. Dugas and Ford, of the Medical College of Augusta.

Nos. 24 & 25, time by chron. Therm. 55°,

7*h* 5*m* 9*s*,	by obs. sun's centre alt. 25° 42′ 32.″7.
8 39 39	43 52 35.1.

Correction of index error additive 15″ to sun's alt.

No. 26, by Mr. Nicollet, at the "Red Pipe Stone Quarry," on the "Coteau des Prairies," Sioux Indian Country, Iowa Territory. Latitude 44° 0′ 52″; long. 6*h* 25*m* 17*s*; assisted by Lieut. Charles Tremont, of the U. S. Topographical Engineers.

No. 32, by Mr. Nicollet, power 100, Dollond, clear sky, on the east shore of Ti Tanka Taminan Lake, Lahontan River, Sioux Country, Iowa Territory. Lat. 44° 16′ 41″; long. 6*h* 13*m* 23.*s*0.

Nos. 33 & 34, by Dr. Goebel, at his residence near Newport, Franklin County, Missouri, power 40. Lat. 38° 33′ 58″; long. 6*h* 4*m* 28.*s*6.

No. 35, by Mr. Nicollet, at his encampment on the "Coteau du Missouri," Tanktonan Indian Country. Lat. 44° 51′ 11″; long. 6*h* 36*m* 18*s*.

No. 36, by Mr. Nicollet, at the garden of the Cathedral, St. Louis, Missouri. Lat. 38° 37′ 28″; long. 6*h* 1*m* 0.*s*7.

Prof. Bache read a communication from Lieut. J. M. Gilliss, U. S. N., director of the Magnetic Observatory at Washington, containing a description of the Observatory and of the declination instrument, with the means of the observations for 1840, at the different magnetic hours. This communication was referred to a Committee.

Dr. Hare communicated orally an experiment, showing that foggy air is not a conductor of electricity.

He adverted to the well known influence of moisture in paralyzing the efficacy of electrical apparatus. When the dew point is so high as to deposite moisture on the walls within doors, the most powerful machines were found incompetent to generate electrical excitement.

Dr. J. K. Mitchell having expressed the opinion, founded on some

facts by him noticed, that this deterioration was not the consequence of the direct conducting power of the mixture of air and aqueous vapour, within which the apparatus was situated, but of the adjacent solid surfaces thereby moistened, Dr. Hare determined to ascertain by experiment, whether the view taken by Dr. Mitchell was correct, being the more encouraged to expect an affirmative issue, from the copious evolution of electricity which had been recently ascertained to take place during the condensation of high steam.

Dr. Hare proceeded to describe his experiment. A cup of hot water, to supply vapour, was placed within a large bell glass, having an open neck of above three inches in diameter; so that the centre of the neck might be immediately under the positive conductor of a large electrical machine. A knob, communicating with the negative conductor, was supported in the centre of the bell glass. Next a red-hot rod of iron, terminating in a knob, was suspended by a wire from the positive conductor, so as to descend, concentrically, through the neck, until within striking distance of the knob above mentioned.

It will be perceived that, in consequence of the high temperature of the rod, and the heat radiating from it to the neck of the bell glass, no moisture could condense upon either, so as to impair the power of the former to give sparks, or of the latter to act as a non-conductor.

The apparatus being thus prepared, and the machine in operation, sparks were found to pass through the foggy air occupying the cavity of the bell glass, as if no moisture had been present.

Dr. Hare conceived that the fact that the aqueous vapour does not impair the insulating power of air, must justify some important meteorological inferences. It was well known that pith balls and other light bodies separate when under the effect of electrical excitement, and it had been justly assumed that the circumambient air must be similarly affected. Thus, when, by its condensation, aqueous vapour evolves electricity, as it does not destroy the insulating power of the air, the aërial particles must be surcharged with that fluid. But, since charging with electricity must cause, in those particles, a disposition to remove from each other to a greater distance, the air must occupy a greater bulk, in proportion as it is more highly charged: in other words, it must be rarefied, and rendered specifically lighter. Hence it will rise to a greater elevation than its temperature, unassisted by electrical reaction, would enable it to reach. It follows that a sudden discharge of electricity, such as is productive of lightning, by causing a sudden augmentation of gravity, may induce a descent of the mass

of aëriform matter and moisture thus discharged. Hence might arise the squalls which accompany electrical storms.

Moreover, large masses of moist air, being thus rendered preternaturally light by electrical excitement, may be made to rise to a situation sufficiently cold to cause the congelation of their moisture; and a simultaneous discharge of electricity ensuing, by a species of reaction the aqueous particles may tend to coalesce with an accelerated force, acting oppositely to that by which they had been kept unduly asunder, and thus be aggregated into the lumps of ice called hail.

In many cases, a reciprocal action between thunder clouds had been noticed, and had been explained by supposing them to be differently electrified. This supposition was rendered now reasonable by the fact that, per se, moisture does not destroy the insulating property of air, as demonstrated by the experiment described in the commencement of this communication.

Dr. Hare made a further oral communication, in relation to the fusibility of iridium and rhodium.

He stated his impression that neither iridium nor rhodium, two of the metals accompanying the native grains of platinum, had heretofore been fairly fused. By the colossal battery of Children, a globule of fused iridium is alleged to have been obtained; but both the admitted porosity and specific gravity of that specimen furnished objections to its being considered as pure. Of both the metals in question, by means of his hydro-oxygen blowpipe, within a few months previous, Dr. Hare had succeeded in fusing specimens of unquestionable purity. He had also fused the osmiuret of iridium, as existing in the native spangles, associated with platinum ore. This alloy was found much more difficult of fusion than pure iridium. Both iridium and rhodium became more fusible by continued and repeated fusion. Both appeared to evolve some volatile matter, and did not become completely solid until after being repeatedly fused.

Mr. Walker informed the Society, that Prof. Loomis had succeeded in observing Encke's comet, at its late return, with a five feet Equatorial, by Simmes, belonging to Western Reserve College. Mr. W. further stated, that Professor Loomis had made some interesting observations on a tornado, which had recently passed over a district in the north of Ohio, and that the phenomena tended to confirm the theory of a rotary motion.

Dr. Hays called the attention of the Society to an abstract, recently published, of a paper read by Prof. Owen to the Geological Society of London, relative to Mr. Koch's collection of mammalian remains.

Prof. Owen, it is stated, by a series of comparisons of the lower jaws in that collection, has "arrived at the conclusion, that the *Tetracaulodon* of Godman is the immature state of both sexes of the *Mastodon giganteum*, and that it loses these distinctions in the mature state of both sexes, by the loss of one tusk in the male, and by the loss of both in the female."

Prof. O. conceives, that these views are supported by analogies, and he refers to the Dugong and Narwhal as examples. In the former, in both sexes, the lower jaw is provided, at its deflected extremity, with six incisors, which disappear in the mature animals, one or two abortive remnants at most being occasionally discovered hidden in the irregular cancellous sockets. In the male Dugong the upper incisors are protruded, scalpriform, and of unlimited growth; while in the female they are concealed, cuspidate, and solid at their base, which is expanded.

In the Narwhal, the young of both sexes have a single incisor equally developed on each side of the upper jaw; one of which grows rapidly in the male, constituting the well-known spirally twisted tusk, while the other remains stationary; and both continue rudimental in the female.

Dr. Hays awarded to Prof. Owen's theory the merit of being very ingenious, of embracing all the facts presented by the collection of Mr. Koch, and of explaining several difficulties which had hitherto existed; still he conceived that it was founded on too limited observations to challenge our implicit credence. A complete series of jaws of both sexes and of all ages, which is necessary to settle this question, has never yet been brought to light, and Dr. H. could not, therefore, refer the Society to any specimens which refuted the above theory; but still he would invite the attention of the Society to some, which, at least, created strong doubts of its entire correctness.

Dr. H. then exhibited two casts, one representing the chin and right side of a lower jaw, belonging to the museum of the University of Virginia, figured in Vol. IV. N. S. pl. XXVII, of the Society's Transactions; the other, the left side of a lower jaw, in the Wistar Museum, and figured in Trans. Vol. IV. N. S. pl. XXI. Both of these had appertained to animals of the same age and adolescent (having two molars only left, the ultimate and penultimate ones); yet

the first had had two tusks of the largest size, whilst the second had none, or any trace of alveolus. Two lower jaws in the cabinet of the Society, of nearly the same age, (described and figured in the Trans. Vol. IV. Plates XXIV. and XXV.) were also destitute of tusks, or alveoli for them.

Dr. H. examined the analogies adduced by Prof. Owen in support of his theory, and expressed the opinion that they were very remote; and as the extensive knowledge of that distinguished naturalist had not furnished him with closer ones of the desired character, it was clearly presumable that none could be adduced.

A much closer analogy, Dr. H. observed, was to be found in the Dinotherium, a very nearly allied animal; but so far as its remains, hitherto obtained, enabled us to decipher its history, it was furnished with two tusks in the lower jaw.

On the whole, Dr. H. saw little reason to change the opinion first expressed by him (see Trans. Vol. IV. p. 318.) that "it is impossible in the existing state of our knowledge, and with our present materials, either to confirm or positively refute the suggestion," that the tusks in the lower jaw are a mere sexual character. The honour of establishing this point is yet to be reaped. Should the suggestion, however, prove correct, Dr. H. believed it would be found that the male had two tusks in the lower jaw, instead of one, as supposed by Prof. Owen; and that the jaw in Mr. Koch's collection, containing a single tusk, is to be considered an anomaly.

Stated Meeting, May 20.

Present, twenty-three members.

Dr. PATTERSON, Vice-President, in the Chair.

Letters were read:—

From M. Alexis de Tocqueville, dated Paris, 7th April, 1842, acknowledging the honour done him by his election as a member of this Society:—also from Dr. Locke, of Cincinnati, dated 12th May, 1842, accompanying a donation, presented through Mr. Dobson.

The following donations were announced:—

FOR THE LIBRARY.

Quarterly Summary of the Transactions of the College of Physicians of Philadelphia. No. 2. For Feb. March and April. 8vo. Philadelphia, 1842.—*From the College.*

The American Medical Library and Intelligencer. By R. Dunglison, M.D. New Series. Vol. I. No. 10. For April. 8vo. Philadelphia, 1842.—*From the Editor.*

Report upon the Standards of the Liquid Capacity Measures, &c. &c. with Description of a New Original Barometer, and of the Balance for adjusting the Half-bushels by their Weight of Distilled Water. By F. R. Hassler. Senate Document, No. 225. 2d Session, 27th Congress.—*From the Author.*

Tabular View of the Scholastic Institutions in the Russian Empire. 4to. St. Petersburg, 1838.—*From the Imperial Academy of Sciences of St. Petersburg.*

Case, and Opinion of P. S. Du Ponceau and A. Davezac, Counsellors, on the Contested Seat of the Hon. David Levy, Delegate from Florida.—*From the Hon. David Levy.*

FOR THE CABINET.

A Collection of Casts of Fossils, chiefly of Western Rocks.—*From Prof. John Locke.*

The Committee, consisting of Prof. Bache, Mr. Nicollet and Dr. Patterson, to whom was referred the paper of Prof. Loomis, entitled, "Observations of the Magnetic Dip in the United States, Fourth Series," reported in favour of its publication in the Transactions of the Society; and the publication was ordered accordingly.

The same Committee reported in favour of publishing in the Transactions, Professor Loomis's Supplementary Observations on the Storm which occurred about the 20th of December, 1836; and its publication was ordered accordingly.

The Committee, consisting of Mr. Walker, Dr. Patterson and Prof. Kendall, to whom was referred the paper of Mr. Nicollet, entitled, "Astronomical Observations made at various Places in the United States," recommended the same for publication in the Society's Transactions, and the recommendation was adopted.

Mr. Walker read a paper, entitled, "Observations of Encke's Comet in March and April, 1842, at the High School Observatory, with the 9 feet Fraunhofer Equatorial, by Sears C. Walker and E. Otis Kendall;" which was referred to a Committee.

The true right ascensions and declinations of the stars of comparison, on the evenings of observation, are stated in the paper as follows:

a =	1 46 11.18,	a' = +	16 46 26.04,	*9	Mag.,	Bessel's Zone, No. 394.	
„	1 46 11.28,	„	16 46 31.26,	9	„	Lalande H. C., p. 192.	
b =	1 46 10.55,	b' =	16 41 24.72,	9	„	Bessel's Zone, No. 394.	
c =	1 49 25.88,	c' =	16 46 1.69,	8	„	„ „ „	
„	1 49 25.51,	„	16 46 8 32,	8.9	„	Lalande, H. C., p. 192.	
d =	1 49 41.70,	d' =	16 52 32.70,	10	„	Anonym. Approx.	
f =	2 1 4.60,	f' =	17 15 12.90,	10	„	„ „	
g =	1 59 6.71,	g' =	17 16 29.60,	7.8	„	Bessel's Zone, No. 394.	
„	1 59 6.51,	„	17 16 33.80,	7.8	„	„ „ „	332.
„	1 59 6.01,	„	17 16 29.60,	7.8	„	Piazzi	
h =	2 3 52.90,	h' =	17 16 51.50,	10	„	Anonym. Approx.	
i =	2 17 18.20,	i' =	17 17 0.70,	9.10	„	„ „	
k =	2 31 58.31,	k' =	15 0 18.69,	8.9	„	Bessel's Zone, No. 394.	
„	2 31 58.10,	„	15 0 20.83,	8.9	„	„ „ „	141.
l =	2 32 46.87,	l' =	14 57 48.28,	9	„	„ „ „	141.
„	2 32 47.35,	„	14 57 51.90,	9	„	„ „ „	32.

The measures and transits observed with the Filarmicrometer were reduced by the formulæ of Bessel in the Astr. Nachr. No. 69, and in the Königsberg Observations, Vol. XV. p. 22. Those of the same star were referred to a common epoch, by means of Encke's Ephemeris. The probable errors were computed in the usual manner. The true places of the comet in right ascension and declination, were obtained free from aberration, parallax and refraction.

Date.	Sidereal time at Philadelphia. μ	Comet's place freed from Aberration, Parallax, and Refraction.		No. of single results.
		α = Comet's true R. A.	δ = Comet's true dec.	
1842.	h m s	m s s	′ ″ ″	
March 27	7 54 57	a + 0 18.358 ± 0.06	a' − 1′ 29.38 ± 1.9	3
„ 27	7 59 21	b + 0 20.404 ± 0.60	b' + 3 29.28 ± 2.3	3
„ 28	7 37 55	c + 0 39.279 ± 0.16	c' + 7 43.22 ± 2.1	5
„ 28	7 50 54	d + 0 22.790 ± 0.03	d' + 1 20.91 ± 0.3	2
„ 31	7 54 35	f − 0 7.860 ± 0.12	f' − 1 46.13 ± 1.6	4
„ 31	8 36 34	g + 1 56.222 ± 0.65		3
April 1	7 50 51	h + 0 38.149 ± 0.34	k' − 0 8.51 ± 0.4	3
„ 5	8 42 12	i + 0 45.608	i − 11 26.31	1
„ 11	8 53 36	k − 1 41.525 ± 0.19		4
„ 11	8 54 1	l − 2 29.715 ± 0.28		4

By applying the places of the known stars in the above collection, the final results are found as follows:

Date.	Sidereal time at Philadelphia.	Comet's true R. A. and Dec. from Observation.		Correction of Encke's Ephemeris.		No. of results.	Authority for Star's Place.
	μ	α	δ	Cos $\delta\Delta\alpha$	$\Delta\delta$		
1842.	h m s	h m s	° ′ ″	s.	″		
Mar. 27	7 54 57	1 46 29.54	+16 44 56.7	+ 0.57	+ 5.4	3	Bessel's Zones.
„ 27		1 46 29.64	+16 45 1.9	+ 0.67	+10.6	3	Lalande H. C.
„ 27	7 59 21	1 46 30.95	+16 44 54.0	+ 1.30	+ 0.9	3	Bessel's Zones.
„ 28	7 37 55	1 50 5.16	+16 53 44.9	+ 2.75	+ 2.6	5	„ „
„ 28		1 50 4.79	+16 53 51.5	+ 2.40	+ 9.3	5	Lalande H. C.
„ 31	8 36 34	2 1 2.83		+ 0.33		3	Bessel's Zones.
„ 31		2 1 2.23		− 0.24		3	Piazzi.
April 11	8 53 36	2 30 16.67		− 1.85		4	Bessel's Zones.
„ 11	8 54 1	2 30 17.40		− 1.16		4	„ „

Mean of 33 results, cos $\delta\Delta\alpha = +\ 0s.65 \pm 0s.32$.
„ 19 „ $\Delta\delta = +\ 5''.8 \pm 1''.2$.

Dr. Hare laid before the Society various specimens of fused iridium, osmiuret of iridium, and of rhodium.

The largest mass of iridium weighed sixty-seven grains; that of rhodium ninety grains. The former leaned towards the pale brilliant white of antimony, the latter towards the ruddy hue of bismuth. Both metals had a pre-eminent disposition to crystallize. The rhodium, in congealing from the state of a globule as fluid as mercury, became studded all over its surface with crystalline facets, excepting the portion in contact with the support. A portion of the interior of a globule of iridium ran out during congelation, coating the outside partially with crystalline facets. This excessive propensity to crystallize rendered it difficult to obtain regular globules of this metal. This propensity was displayed in a higher degree by the native osmiuret. Dr. Hare suggested that the greater difficulty of fusing this alloy might be ascribed to the infusibility of osmium, which might resemble carbon in forming a volatile oxide, and in being infusible per se.

Dr. Hare made some remarks respecting the cause of the persistence of clouds between certain elevated levels.

He said that, in the last number of the Society's "Proceedings," a brief mention had been made of some observations and an explana-

tion advanced by him respecting the suspension of clouds. He had, however, to regret that the most essential parts of his communication had not been reported. With the permission of the Society, he would recapitulate his communication, in order that the readers of the "Proceedings," and members who were not present when he spoke on the subject in question, might not have an erroneous impression. He would also add some suggestions which had recently occurred to him.

It is well known that, although there were occasionally two different sets of clouds pertaining severally to different currents of air, one above the other,—usually, in fair weather, there was but one set. In either case all the clouds belonging to one current are seen to be situated somewhere between two levels. Above the space, included between these levels, none are seen to rise; nor are any observed to sink below its lower boundary. It was conceived that the causes of this persistence of the clouds between two horizontal planes, of which the lower one is usually more than a mile in height, had never been satisfactorily assigned.

Agreeably to the prevalent impression that clouds are enduring masses of condensed aqueous vapour, their specific gravity ought to be much greater than that of the subjacent cloudless air, over which they swim; since the little watery bubbles of which they are formed, consist, not only of the air with which they are inflated, but also of a liquid 840 times as heavy. But he had of late years observed that clouds are not as durable as generally supposed. On the contrary, like the steam condensed in escaping from boiling water, they are incessantly forming by the condensation of aqueous vapour, and disappearing in consequence of its being vaporized again. A cloud may appear to cling to the brow of a mountain, sometimes for more than an hour; when, on closer examination, it may be discovered that, as one portion appears, another vanishes, and that the apparent durability is due to the equality of the causes of condensation and re-vaporization. Dr. Hare had enjoyed a fine opportunity of verifying this view of the subject, when involved within a cloud on the summit of the Rhigi, last summer. It was then quite evident, that what might, at a distance, be mistaken for an enduring mass of condensed moisture, such as is called a cloud, was really due to a current of air, saturated with aqueous vapour, which was rushing up the mountain side. As this current reached a level, at which the temperature was below its dew point, the contained vapour was converted by condensation into a cloud; but as it attained a higher level, where the dew point was sufficiently low to compensate for the cold, the moisture was made to resume the aëriform state.

As in condensing, steam relinquishes as much heat as would make it red-hot, if retained while under sufficient pressure to keep it in the liquid state, it follows that, as the cloud is formed, the temperature of the air with which it is associated is raised so much as to produce a buoyancy which enables it to float or even to ascend;* but as soon as it reaches a point where the air is so devoid of aqueous vapour as to permit it to be revaporized, a proportionable refrigeration and increase of density ensues. Thus the buoyancy produced at one level, is compensated by a commensurate opposite influence at another. Of course, the clouds are always seen to occupy an interval between two horizontal planes, one above the other. As soon as the aqueous vapour of the air rises above the lower plane it condenses; before the cloud thus produced can get beyond the upper one it is reconverted into vapour.

When the causes of condensation are more potent than those of revaporization, rain ensues; when the opposite is the case, there must be a tendency to fair weather.

Although of opinion that in hurricanes and other violent rain storms, there must be an exchange of position between the lower and upper strata of the air, it was conceived that showers, unaccompanied by gales or squalls, were to be explained as above suggested.

Dr. Hare had conceded that there might be more than one cause for the buoyancy of clouds. Dr. Thomson, in his treatise respecting Heat and Electricity, suggests electricity as a cause. The fact demonstrated by the experiment, the results of which had been communicated to the Society at their last meeting in April, that moisture does not render air a conductor of electricity, gives support to this view of the subject; especially since it has been discovered, that in condensing, steam becomes highly electrified. It seems inevitable that the aqueous globules, of which clouds are constituted, must separate from each other, as pith balls are seen to do when similarly excited; and that the particles of air with which they are associated must be similarly actuated: hence a cause of rarefaction, and of course of buoyancy. Another cause might co-operate. It is known that the radiation of heat, which causes dew and sometimes hoarfrost, is so completely checked by clouds, that the last mentioned phenomenon never takes place when the sky is overcast. Moreover, it is known that the solar rays pass through the air without imparting heat,

* See a verbal communication of Dr. Hare, made July 3d, 1840, and published in the "Proceedings" for that time.

until intercepted by solids or liquids. It follows that the air in which clouds are situated, will be warmer than that above and below them.

Thus radiant heat and electricity may promote their buoyancy; nevertheless their persistency between two levels must be ascribed to the process noticed on the summit of the Rhigi.

Mr. Espy had the merit of drawing the attention of meteorologists more strongly to the fact, *previously made known by Dalton*,* that, although cold is produced by the rarefaction of air containing vapour, yet the reduction of temperature is less, whenever the vapour is condensed, than it would have been in air free from vapour.

In adopting the explanation above given, Dr. Hare had been prompted by his knowledge of Mr. Espy's suggestions founded on those of Dalton, so far as a superior temperature had been ascribed to the air containing a recent cloud.

Mr. Boyè made an oral communication relative to a white crystalline mineral, which occurs three or four miles to the south of West Chester, Pa., and which encloses corundum and several other mineral species.

The specimen was handed to him for examination by Mr. Nuttall, several years since, and, proving to be a silicate closely allied to a felspar, he subjected it to analysis, in conjunction with Prof. Booth, in order to compare it with the several felspars previously investigated by them.

It forms a white translucent mass composed of densely aggregated crystalline grains, and might be mistaken, at the first glance, for a moderately coarse-grained marble, did not its hardness indicate a totally different substance. Its specific gravity is 2.612.

The analysis was performed in the manner mentioned in the Proceedings of the Society for May, 1841, and gave the following results:

		Oxygen.		
Silica,	67.72	35.18		
Alumina, with a trace of iron,	20.54	9.593		12.69
Magnesia,	0.34	0.131	3.101	
Lime,	0.78	0.219		
Soda,	10.65	2.724		
Potassa,	0.16	0.027		
	100.19			

* See Nicholson's Journal, vol. iii. p. 160, or Manchester Memoirs, vol. v. p. 515.

This composition approaches nearest to that of albite, excepting in a deficiency of silica, in which respect it resembles the albite from the vicinity of Wilmington, otherwise corresponding to it closely in composition, and agrees also with an albitic felspar from Pennsylvania, analyzed by Redtenbacher, in Prof. Rose's laboratory at Berlin, (Poggendorff's Annalen, Vol. LII. p. 469,) as shown by the following comparative table.

ALBITE.	Six miles N. W. of Wilmington, Del. *Booth & Boyé.*	Pennsylvania. Locality not stated. *Redtenbacher.*	Granular Var'y. West Chester, Pa. *Booth & Boyé.*
Silica, . .	65.46	67.20	67.72
Alumina, . .	20.74	19.64*	20.54
Sesquioxide of iron,	0.54	——	a trace.
Magnesia, .	0.74	0.31	0.34
Lime, . .	0.71	1.44	0.78
Soda, . .	9.98	9.91	10.65
Potassa, . .	1.80	1.57	0.16
	99.97	100.07	100.19

On motion of Dr. Hays, it was resolved that a set of casts of fossil remains, made at the expense of the Society, be presented to Prof. Kaup, for the Museum of Darmstadt.

On motion of Mr. Booth, it was resolved, that the Curators have authority to permit Dr. Locke, of Cincinnati, to take casts from such specimens of fossils, as in their judgment may not be injured thereby, provided that the moulds be left with the Society and become their property.

Stated Meeting, June 17.

Present, twenty-nine members.

Dr. CHAPMAN, Vice-President, in the Chair.

Letters were read:—

From E. D. Ingraham, Esq., dated 10th June, 1842, asking permission to make a transcript of Mr. Breck's unpublished memoir on the Continental Money of the United States, now in the Society's Archives:—

From the Secretary of the Committee of Physics of the

* Redtenbacher states that the alumina contained titanic acid.

Royal Society of London, dated 5th April, 1842, transmitting the first number of the Proceedings of that Committee:—and

From Mr. William Vaughan, of London, dated 7th May, 1842, announcing the transmission by him of donations from the Royal Society to the library of this Society.

The permission asked by Mr. Ingraham was granted.

The following donations were announced:—

FOR THE LIBRARY.

Report of the Eighth Meeting of the British Association for the Advancement of Science, held at New Castle in August, 1838. 8vo. London, 1839.—*From the Association, through Col. Sabine.*

Report of the Tenth Meeting of the British Association, held at Glasgow, in August, 1840. 8vo. London, 1841.—*From the same.*

Report of the Eleventh Meeting of the British Association, held at Plymouth, in July, 1841. 8vo. London, 1842.—*From the same.*

Proceedings of the Royal Astronomical Society. Vol. V. No. 21. 8vo. London, 1842.—*From the Society.*

A Comprehensive History of the Iron Trade throughout the World, from the earliest Records to the present Period. By Harry Scrivenor. 8vo. London, 1841.—*From Mr. Jacob Snider, Jr.*

Sixth Census, or Enumeration of the Inhabitants of the United States. Folio. Washington, 1841.—*From the Hon. G. W. Toland.*

Public Documents. Senate, No. 225. House of Representatives, No. 176, No. 683.—*From the same.*

The American Medical Library and Intelligencer. By R. Dunglison, M.D. New Series. Vol. I. No. 11. For May. 8vo. Philadelphia, 1842.—*From the Editor.*

Onzième Rapport Annuel sur les Travaux de la Société d'Histoire Naturelle de l'Ile Maurice. Par M. Louis Bouton, Secrétaire. 8vo. Maurice, 1841.—*From the Society.*

Mémoires de la Société des Antiquaires de l'Amérique du Nord. Partie Linguistique. Par M. Gallatin. Paris, 1842.—*From Mr. Du Ponceau.*

The Twenty-sixth Report of the Directors of the American Asylum, at Hartford, for the Education of the Deaf and Dumb. 8vo. Hartford, 1842.—*From the Directors.*

Second Bulletin of the Proceedings of the National Institution for the Promotion of Science. From March, 1841, to February, 1842. 8vo. Washington, 1842.—*From the Institution.*

Arsberättelse om Framstegen i Fysik och Kemi afgifven den 31 Mars, 1839; af Jac. Berzelius. 8vo. Stockholm, 1840.—*From the Royal Swedish Academy.*

Kongl. Vetenskaps-Academiens Handlingar. För år 1839. 8vo. Stockholm, 1841.—*From the same.*

Arsberättelse om Technologiens Framsteg. Till Kongl. Vetenskaps-Academien afgifven den 31 Mars, 1839; af G. E. Pasch. 8vo. Stockholm, 1840.—*From the same.*

Tal af Academiens Præses, Grefve M. Rosenblad. 8vo. Stockholm, 1840.—*From the same.*

Journal of the Franklin Institute. Third Series. No. 6. For June. Philadelphia, 1842.—*From Dr. Patterson.*

Proceedings of an Indian Council, held at the Buffalo Creek Reservation, State of New York. Fourth Month, 1842. 8vo. Baltimore, 1842.—*From Mr. G. M. Justice.*

Professor Henry, of Princeton, presented the record of a series of experiments on induction from ordinary electricity, as the fifth number of his Contributions to Electricity and Magnetism, which was referred to a Committee. Of these experiments he gave a verbal account, of which the following is the substance.

In the third number of his Contributions he had shown on this subject: 1. That the discharge of a Leyden battery through a conductor developed, in an adjoining parallel conductor, an induced current, analogous to that which, under similar circumstances, is produced by a galvanic current. 2. That the direction of the induced current, as indicated by the polarity given to a steel needle, changes its sign with a change of distance of the two conductors, and also with a change in the quantity of the discharge of electricity. 3. That, when the induced current is made to act on a third conductor, a second induced current is developed, which can again develope another, and so on through a series of successive inductions. 4. That, when a plate of metal is interposed between any two of the consecutive conductors, the induced current is neutralized by the adverse action of a current in the plate.

The direction of the induced currents in all the author's experiments was indicated by the direction of the polarity given to steel needles inclosed in a spiral, the wire of which formed a part of the circuit. But some doubts were reasonably entertained of the true indications of the direction of a current by this means; since M. Savary

had published, in 1826, that, when several needles are placed at different distances above a wire through which the discharge of a Leyden battery is passed, they are magnetized in different directions, and that by constantly increasing the discharge through a spiral, several reversions of the polarity of the contained needles are obtained.

It was, therefore, very important, before attempting further advances in the discovery of the laws of the phenomena, that the results obtained by M. Savary should be carefully studied; and accordingly the first experiments of the new series relate to the repetition of them. The author first attempted to obtain them by using needles of a larger size, Nos. 3 and 4, such as he had generally employed in all his previous experiments; but, although nearly a thousand needles were magnetized in the course of the experiments, he did not succeed in getting a single change in the polarity. The needles were always magnetized in a direction conformable to the direction of the electrical discharge. When, however, very fine needles were employed, he did obtain several changes in the polarity in the case of the spiral, by merely increasing the quantity of the electricity, while the direction of the discharge remained the same.

This anomaly, which has remained so long unexplained, and which at first sight appears at variance with all our theoretical ideas of the connection of electricity and magnetism, was, after considerable study, satisfactorily referred by the author to an action of the discharge of the Leyden jar, which had never before been recognised. The discharge, whatever may be its nature, is not correctly represented (employing for simplicity the theory of Franklin) by the single transfer of an imponderable fluid from one side of the jar to the other; the phenomena require us to admit *the existence of a principal discharge in one direction, and then several reflex actions backward and forward, each more feeble than the preceding, until the equilibrium is obtained.* All the facts are shown to be in accordance with this hypothesis, and a ready explanation is afforded by it of a number of phenomena which are to be found in the older works on electricity, but which have, until this time, remained unexplained.

The same action is evidently connected with the induction of a current on its own conductor, in the case of an open circuit, such as that of the Leyden jar, in which the two ends of the conductor are separated by the thickness of the glass. And hence, if an induced current could be produced in this case, one should also be obtained in that of a second conductor, the ends of which are separated; and

this was detected by attaching to the ends of the open circuit, a quantity of insulated metal, or by connecting one end with the earth.

The next part of the research relates to a new examination of the phenomena of the change in the direction of the induced currents with a change of distance, &c. These are shown to be due to the fact that the discharge from a jar does not produce a single induced current in one direction, but several successive currents in opposite directions. The effect on the needle is principally produced by two of these: the first is the most powerful, and in the adverse direction to that of the jar; the second is less powerful, and in the same direction with that of the jar. To explain the change of polarity, let us suppose the capacity of the needle to receive magnetism to be represented by ± 10, while the power of the first induced current to produce magnetism is represented by -15, and that of the second by $+12$; then the needle will be magnetized to saturation or to -10, by the first induced current, and immediately afterwards all this magnetism will be neutralized by the adverse second induction, and a power of $+2$ will remain; so that the polarity of the needle in this case will indicate an induced current in the same direction as that of the jar. Next, let the conductors be so far separated, or the charge so much diminished, that the power of the first current to develope magnetism may be reduced to -8, while that of the second current is reduced to $+6$, the magnetic capacity of the needle remaining the same. It is evident, then, that the first current will magnetize the needle to -8, and that the second current will immediately afterwards neutralize 6 of this; and consequently the needle will retain a magnetism of -2, or will indicate an induced current in an opposite direction to that of the jar.

In extending the researches relative to this part of the investigation, a remarkable result was obtained in regard to the distance at which inductive effects are produced by a very small quantity of electricity; a single spark from the prime conductor of the machine, of about an inch long, thrown on the end of a circuit of wire in an upper room, produced an induction sufficiently powerful to magnetize needles in a parallel circuit of wire placed in the cellar beneath, at a distance of thirty feet perpendicular, with two floors and ceilings, each fourteen inches thick, intervening. The author is disposed to adopt the hypothesis of an electrical plenum, and from the foregoing experiment it would appear, that the transfer of a single spark is sufficient to disturb perceptibly the electricity of space throughout at least a cube of 400,000 feet of capacity; and, when it is considered

that the magnetism of the needle is the result of the difference of two actions, it may be further inferred, that the diffusion of motion in this case is almost comparable with that of a spark from a flint and steel in the case of light.

The author next alludes to a proposition which he advanced in the second number of his Contributions, namely, that the phenomena of dynamic induction may be referred to the known electrical laws, as given by the common theories of electricity; and he gives a number of experiments to illustrate the connection between statical and dynamical induction.

The last part of the series of experiments relates to induced currents from atmospheric electricity. By a very simple arrangement, needles are strongly magnetized in the author's study, even when the flash is at the distance of seven or eight miles, and when the thunder is scarcely audible. On this principle, he proposes a simple self-registering electrometer, connected with an elevated exploring rod.

Dr. Hare made an oral communication, in continuation of his remarks, made at the last meeting, on platinum and the metals accompanying its native grains.

He stated that, agreeably to trials made by Mr. J. R. Eckfeldt, of the mint, and Mr. Boyè, both possessing balances of exquisite accuracy, and being eminently skilful in the use of them, the specific gravity of a fused globule of iridium of sixty-seven grains in weight, obtained from a warranted specimen of iridium, purchased of Johnson and Cocke, of London, was inferred to be 21.80. Agreeably to this result, and likewise the previous observations of Breithaupt upon certain specimens of native iridium, this metal, either in this state, or as obtained in purity by chemical skill and consolidated by fusion, must be allowed that pre-eminence in density over all other bodies, which, until of late, was conceded to platinum. In fact, as contrasted with platinum, obtained by fusion without subsequent hammering, the difference would be more than one-tenth. Specimens of hammered platinum which weighed 21.23, on fusion were reduced to 19.70.

An important inference from these results was, that, as iridium is the only impurity in standard platinum, a high specific gravity indicates neither a superior degree of purity nor malleability. A piece of standard malleable platinum, of a very fine white colour, presented to Dr. Hare by his excellency Count Cancrine, the Russian minister of finance, as of the best quality of Russian platinum, proved, according to Eckfeldt, to have a specific gravity of 21.31; when a specimen,

purified from iridium agreeably to the instructions of Berzelius, and which had been found pre-eminently susceptible of being beaten into leaf, weighed only 21.16.

On its first fusion, Dr. Hare found the specific gravity of rhodium, 11; precisely what, on examining his books, it was ascertained to have been made by Wollaston. But after it had crystallized superficially, as above described, it was by a magnifier discovered to be minutely porous under the facets. In this state its specific gravity was found by Eckfeldt to be 10.8.

The Committee appointed on the 29th of April, to whom were referred the reports of the Committee of purchase and sale, and of the Committee having charge of the Museum property, presented a report, the consideration of which was postponed to an adjourned meeting, to be held on the first of July next.

Dr. Harlan mentioned that the moulds of the Megalonyx bones, belonging to the Society, cannot now be found, and requested that permission may be accorded to him to have new moulds made at his own expense, under the superintendence of the Curators. On motion, the request of Dr. Harlan was granted.

Adjourned Meeting, July 1.

Present, ten members.

Rev. Dr. BETHUNE in the Chair.

In consequence of the smallness of the meeting, owing to the inclemency of the weather, the Society was adjourned, to meet on Tuesday evening, the 5th instant.

Adjourned Meeting, July 5.

Present, thirty-six members.

Dr. CHAPMAN, Vice-President, in the Chair.

The report of the Committee appointed on the 29th of April was read; whereupon, on motion, the Committee was dis-

charged from the further consideration of the subjects referred to them.

On motion of Mr. S. C. Walker, it was resolved that a Committee of five members be appointed to inquire, and report at the next meeting, concerning the proper course to be pursued for the protection of the principal and accumulation of the trust funds of the Society. Committee, Mr. Walker, Mr. Williams, Mr. T. I. Wharton, Mr. Kuhn, and Mr. G. M. Wharton.

On motion of Dr. Patterson, it was resolved that the Committee on the Museum property be instructed to inquire into the course which, in their judgment, it may be most advisable to take with regard to that property, and that they report to the Society at as early a meeting as practicable.

Stated Meeting, July 15.

Present, thirty members.

Dr. Patterson, Vice-President, in the Chair.

Letters were read—

From Prof. Zantedeschi, of Venice, dated 27th July, 1841, transmitting a copy of his treatise on the Electrotype, and requesting a correspondence with the Society:—

From Laurentius Blanco, of Naples, dated March, 1842, transmitting a copy of his work on the Papyri of Herculaneum.:—

From D. F. Van der Pant, dated 10th May, 1842, presenting Vol. VIII. Part 2, of the Transactions of the Society of Experimental Philosophy of Rotterdam, and giving notice of certain deficiencies in the series of the Transactions of this Society, now in the Library of the Rotterdam Society:—and

From Dr. C. W. Short, of Louisville, Ky., dated 25th May, 1842, stating that he had forwarded a parcel, containing dried specimens of plants of Kentucky, for the Cabinet of the Society.

The following donations were announced:—

FOR THE LIBRARY.

Della Elettrotipia. Memorie di Francesco Zantedeschi. 4to. Venice, 1841.—*From the Author.*

An Engraved Portrait of Mehemet Ali, from a plate produced by the galvanic process.—*From Prof. F. Zantedeschi.*

Astronomical Observations made at the Royal Observatory, Edinburgh. By Thomas Henderson, F. R. S. Vol. IV. for 1838. 4to. Edinburgh, 1841.—*From the Royal Society of London.*

Proceedings of the Royal Astronomical Society. Vol. V. No. 22. 8vo. London, 1842.—*From the Society.*

Discourse delivered before the Historical Society of Pennsylvania, February 21, 1842, on the Colonial History of the Eastern and some of the Southern States. By Job R. Tyson. 8vo. Philadelphia, 1842.—*From the Author.*

The Impropriety of Capital Punishments: or the Report of a Committee on Dr. Cuyler's Sermon, &c. 8vo. Philadelphia, 1842.—*From Job R. Tyson, Esq.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Nos. 11, 12, 13 & 14. For February, March, April & May. 8vo. Philadelphia, 1842.—*From the Academy.*

Instructions pour l'Observation des Phénomènes Périodiques. Par A. Quetelet. 8vo. Brussels.—*From the Author.*

Bulletin de l'Académie Royale de Bruxelles. Vol. VIII. Nos. 10, 11 & 12, and Vol. IX. Nos. 1 & 2. 8vo. Brussels, 1841–42. *From the Academy.*

Nouveau Catalogue des Principales Apparition d'Étoiles Filantes. Par A. Quetelet, Secrétaire perpétuel de l'Académie Royale de Bruxelles, &c. 4to. Brussels.—*From the Author.*

Annuaire de l'Observatoire Royale de Bruxelles. Par A. Quetelet, Directeur de cet Établissement. 1842. 9me Année. 12mo. Brussels, 1842.—*From the Author.*

Annuaire de l'Académie Royale des Sciences et Belles Lettres de Bruxelles. 8me Année. 12mo. Brussels.—*From the Academy.*

Bulletin of the Proceedings of the National Institution for the Promotion of Science. Vol. I. No. 1. 8vo. Washington, 1841.—*From the Institution.*

Address delivered at the Anniversary Meeting of the Geological Society of London, on the 18th of February, 1842. By R. I.

Murchison, F. R. S., President of the Society. 8vo. London, 1842.—*From the Author.*

Journal of the Academy of Natural Sciences of Philadelphia. Vol. VIII. Part 2. 8vo. Philadelphia.—*From the Academy.*

The American Journal of the Medical Sciences. Edited by Isaac Hays, M.D. New Series, No. 7. For July. 8vo. Philadelphia, 1842.—*From the Editor.*

Nieuwe Verhandelingen van het Bataafsch Genootschap der Proefondervindelijke Wijsbegeerte te Rotterdam. Vol. VIII. Part 2. 4to. Rotterdam, 1842.—*From the Society.*

Epitome dei Volumi Ercolanesi del Cav. Lorenzo Blanco. 12mo. Naples, 1842.—*From the Author.*

Abhandlungen der Mathematisch-Physikalischen Classe der Königlich Bayerischen Akademie der Wissenschaften. Vols. I. & II. and Vol. III. Parts 1 & 2. 4to. Munich, 1832–37–40.—*From the Academy.*

Astronomische Beobachtungen angestellt auf der Königl. Sternwarte zu Bogenhausen von dem ordentlichen Mitgliede der Akademie der Wissenschaften I. Soldner. Parts 2, 3, 4 & 5. 4to. Munich, 1835–36–37–38.—*From the same.*

Observationes Astronomicæ in Specula Regia Monachiensi institutæ, et Regio Jussu publicis impensis editæ a J. Lamont. Vols. VI. VIII. & IX. 4to. Munich, 1834–36–41.—*From the same.*

Ueber das Magnetische Observatorium der Königl. Sternwarte bei München. Von Dr. J. Lamont. 4to. Munich, 1841.—*From the Author.*

Rede zum Andenken an Ignaz Döllinger Dr. in der zur Feier des Allerhöchsten Namens-und Geburtstages Sr. Majestät des Königs am 25 August, 1841, gehaltenen öffentlichen Sitzung der Königl. Bayerischen Academie der Wissenschaften vorgetragen von Dr. Ph. Fr. v. Walther. 4to. Munich, 1841.—*From the Author.*

Journal of the Franklin Institute. Third Series. Vol. IV. No. 1. For July. 8vo. Philadelphia, 1842.—*From Dr. Patterson.*

FOR THE CABINET.

A Collection of Dried Plants, made in the State of Kentucky, containing some species, not included in any of the parcels formerly sent by the donor.—*From Dr. Charles W. Short.*

Dr. Patterson stated that he had learned from Mr. Brown, Dragoman to the U. S. legation at Constantinople, that no com-

munication had been received by him in acknowledgment of a donation of coins which he had made to the Society; whereupon, on motion, it was resolved that a duplicate of the usual letter of thanks be transmitted by the Secretaries to Mr. Brown.

The Committee, consisting of Dr. Patterson, Prof. Bache, and Prof. Park, to whom was referred the paper of Prof. Kendall, entitled "Observations on Encke's Comet," &c., reported in favour of its publication in the Society's Transactions; and the publication was ordered accordingly.

Mr. S. C. Walker communicated to the Society the following extract from a letter of Prof. S. Alexander, dated Princeton, N. J., July 14th, 1842, containing the Professor's theory for explaining the remarkable appearance presented by total and annular eclipses of the sun. Prof. A. had taken this early opportunity of laying his views before the Society on a subject which will doubtless cause much speculation in Europe, owing to the occurrence of the remarkable total eclipse of the 7th instant. Prof. A. intended, at some future meeting, to exhibit his reasons in full for the conclusions here announced.

1. If the moon be surrounded by any substance, which can with propriety be termed an atmosphere, the limit of its sensible action upon light will be reduced, in consequence of a permanent terrestrial and anti-terrestrial tide, which will be subject to moderate oscillations of about the same extent with the moon's librations; which tide, however, will preserve a continual accumulation of atmosphere near the point which seems to be the centre of the moon's disc, and that which is diametrically opposite. The elevation of the zone of atmosphere which, in such case, would surround the edge of the disc, must, in consequence, be invariably less than that of almost any other portion. The force of the earth's gravity, tending to produce a tide at the moon's surface, would be more than twenty times as great as that of the moon at the earth's surface, and owing to the feeble gravitation of the moon at her own surface, the same force there would raise a tide some six times as high as at the earth's surface. So that an atmosphere similar to ours would have a tide from the action of the earth about 158 times as high as our atmospheric tides from the action of the moon.

2. Whatever be the constitution of the substance or substances at

the surface of the moon, they exercise an action which at some points deflects, at others inflects, light, producing what (were it not that it cannot at present be asserted that any part of it is due to reflection) might be termed a lunar mirage. In accordance with this general law of action are observed,—the broken cusps, the dark lines, the isolated spots of light of red or other colour, in total and annular eclipses of the sun,—the occasional distortion of planets, the projection of stars upon the moon, and the fact that some of those bodies are not visible at the edge of the moon's disc at emersion, but are first seen at some little distance from it: all of which have been observed in occultations.

3. This action of the moon upon light is *specific;* being more intense in the case of the red ray. Hence many of the phenomena are more readily discernible, when a screen of that colour is employed; though not *altogether invisible*, if the colour of the screen be different. Hence, also, the isolated spots of light, seen during a total eclipse of the sun, are red; and red stars seem to be more frequently projected upon the moon's disc than others.

4. The corona which surrounds the moon during a total eclipse of the sun exhibits—

(*a*) An interior bright edge, which may be due to the action of the moon.

(*b*) Just before the emersion, a well defined portion, which seems to mark a comparative vacuum surrounding the sun.

(*c*) A second portion of more decided density.

(*d*) A rarer portion, exhibiting in some cases decided radiations, which, as has sometimes been supposed, may be the central part of the substance which produces the zodiacal light.

Mr. Boyè mentioned, that Mr. Clark Hare had communicated to him, that, in conjunction with Messrs. Channing and Gibbs, he had succeeded in producing the perchlorate of the oxide of methule, by the same process which Mr. Hare and Mr. Boyè himself had employed for producing the perchlorate of the oxide of ethule; namely, the distillation of the dry sulphomethylate of baryta and perchlorate of baryta.

This compound resembles, in its general properties, the perchlorate of the oxide of ethule, being a colourless liquid, heavier than water, and exploding with great violence on being touched by an ignited body. The force of its explosion seemed, however, less than that of the corresponding compound of ethule; nor did it appear capable of

being ignited by friction or percussion. It was sweet to the taste, but possessed a pungency which in a short time became painful, and attacked the skin of the tongue, so as to destroy the power of tasting, and to leave the surface white for several days afterwards.

Mr. Boyè remarked that, when the perchlorate of ethule was discovered, the quantity of permanent gases generated by its explosion, and the extreme force with which it scattered the pieces of the vessel in which it was contained, had suggested to him the idea of employing it as an explosive agent, and he had designed making some experiments on this subject, by mixing it with small portions of other substances; but finding it perfectly unmanageable, he had abandoned the attempt. The fact that the perchlorate of methule is not explosive spontaneously, or by friction or percussion, suggested a similar idea; principally as this substance contains more oxygen than is necessary for its own combustion, and, therefore, would probably permit still better the admixture of other combustible liquids, so as to control its explosive force, and abate it so far as to render it applicable to purposes of projection. The advantages of such a liquid over common gunpowder would be, in the first place, that it would yield a much greater amount of gaseous matter; secondly, being a liquid, the whole mass would explode at once, while in common gunpowder a portion of the grains are thrown out without being ignited; and, thirdly, being entirely convertible into gases, it would leave no solid residue, which is a great inconvenience with ordinary gunpowder.

Mr. B. further remarked that, in their paper on the perchlorate of ethule, Mr. Clark Hare and himself had expressed the opinion, that, in explosive violence, it was not equalled by any substance known in chemistry; for, although they had never had occasion to compare it directly with the chloride of nitrogen, there was one point in which it evidently much surpassed that substance; namely, the great distance to which its explosion was perceptible, and the force with which it projected the fragments of the containing vessel. Minute pieces of glass might be seen, where it struck the glass plates of the screen, to have been converted into minute heaps of a compressed powder, protruding above the surface of the glass, under which, on removing the powder, a dent appeared. In order to form a more distinct idea of its power, Mr. B. had calculated the volume of gas given off by the perchlorates of ethule and methule, by chloride of nitrogen, and by gunpowder; from which it appears, that, when the temperature to which the gases are raised by the explosion is assumed to be 1000° centigrade, or 1832 Fahrenheit, which is a little lower than the heat

in the white part of flame, the perchlorate of ethule will yield a volume of gas 2⅔ times as great as that yielded by an equal weight of gunpowder, and 2½ times the amount yielded by chloride of nitrogen; while, if the explosion be supposed to take place in a vessel of the exact capacity of the substance, and strong enough to withstand the pressure exercised against its sides, this pressure would be with gunpowder 1566 atmospheres, with chloride of nitrogen 2852, and with perchlorate of ethule (the specific gravity of this latter being assumed to be 1.4) 5648; or the latter would be 3⅔ times that of gunpowder, and twice that of chloride of nitrogen.

Names of the Substances.	Oxygen per cent.	Vol. of gases in cub. centim. at 0° centigr. yielded by one gramme of the substance.*	Composition of the mixture of resulting gases, after explosion, in volumes.	Sp. gr. of the mixture at 0°.	Vol. of gases in cubic centim. at 100° centigr. yielded by one gramme of the substance.	Same vol. of gas expressed by the bulk of the substance as unity.†	Relative proportions of the numbers in the preceding column.
Gunpowder	35.5	330	3 vol. Carb. acid, 1 „ Nitrogen.	1.39	1536	1566‡	1.
Chloride of nitrogen		371	3 vol. Chlorine, 1 „ Nitrogen.	2.07	1726	2852	1.8
Perchlorate of methule	55.8	682	2 vol. Carb. acid, 2 „ Steam, 2 „ Chlorohyd. acid, 1 „ Oxygen.	1.41	3170	4438§	2.8
Perchlorate of ethule	49.7	868	4 vol. Carb. oxide, 4 „ Steam, 2 „ Chlorohyd. acid.	0.89	4034	5648§	3.6

* The steam is here, for convenience, considered not to condense, but to contract regularly from 100° to 0° as a permanent gas.

† This number also expresses the pressure in atmospheres at the moment of explosion.

‡ Gunpowder is here assumed to have the specific gravity of 1.02, as given in Ure's Dictionary, and to have the usual composition of 75 per cent. of nitre. An experiment with Dupont's best Eagle powder, when well shaken together by tapping on the outside of the vessel, gave the specific gravity of 1.055. An analysis of it yielded nitre 77.28, carbon 12.58, sulphur 10.14. It lost by desiccation, in vacuo over sulphuric acid, 0.86 per cent. of hygroscopic moisture, and yielded 0.87 per cent. of ashes, of a bright reddish colour from its carbon.

§ The specific gravity of the perchlorates of the oxides of methule and ethule is unknown, but is assumed to be 1.4, as they are much heavier than water.

The differences will be still more striking, if it be further assumed, that the projective force is not only dependent on the pressure at the time of the explosion, but also on the specific gravity of the gases, or what may be termed their energy; and that, in regard to gunpowder, this effect is considerably lessened by the fact, that, when the explosion takes place in a vessel that yields before the maximum force is attained, a considerable proportion of the powder is thrown out before it can act or be ignited; while, with liquids, the ignition of the whole mass is instantaneous. Mr. B. had no doubt that, in this respect, the force of the perchlorate of the oxide of ethule might be considered more than ten times as great as that of gunpowder. It would also be evident from these considerations, that, in this same respect, the chloride of nitrogen, although considerably inferior to the perchlorates, still greatly surpasses gunpowder; and that a prevalent opinion to the contrary must be founded in a deception, probably arising from the smallness of the quantities of this dangerous substance which can be employed with safety in experiments.

The Committee appointed at the adjourned meeting of the 5th of July, to report in relation to the proper course to be pursued for the protection of the trust funds of the Society, made a report, which was recommitted to the same Committee, with instructions to report at an adjourned meeting, to be held on Friday evening next.

The following gentlemen were elected members of the Society:—

Petty Vaughan, of London.

Frederick Fraley, of Philadelphia.

Adjourned Meeting, July 22.

Present, thirty-five members.

Dr. Patterson, Vice-President, in the Chair.

The report of the Committee on the Museum property, under the resolution passed at the adjourned meeting of the 5th of July, was read, and the Society adopted the recommendations contained therein; namely, that the several instru-

ments of writing, indicated in the report as necessary for carrying into effect the purchase of the Museum property, and for concluding with the Philadelphia Museum Company and with Nathan Dunn, the agreements relative to the occupation of parts of the Museum building, be executed by the President in due form.

On motion of Mr. T. I. Wharton, the Committee on the trust funds of the Society was continued.

Prof. Bache read a communication, in relation to the balance due by the Society for the expenses of the Magnetic Observatory. This communication was referred to the Committee on the trust funds.